

## **Purpose of Plant Tissue Analysis**

Plant tissue analysis measures concentrations of most essential plant nutrients in leaf tissue. Healthy plants contain predictable concentrations of nutrients that vary with plant type and growth stage. Tissue test results are an indicator of plant nutritional health and an excellent basis for diagnosing whether existing problems are nutritional in nature. For tobacco, it is also a good way to determine appropriate time of harvest.

This test is especially useful for monitoring nutrition in high-value crops. Once deficiency symptoms appear, yield has already been compromised, but tissue testing can detect problems before this occurs. As a result, fertilizer inputs can be adjusted to avert problems.

The Agronomic Division chemically analyzes tissue samples, interprets the data and provides management advice. The analysis measures existing concentrations of nutrients required for plant growth, including major nutrients (N, P, K), secondary nutrients (Ca, Mg, S) and micronutrients (Fe, Mn, Zn, Cu, B). Additional tests are available to measure chloride, molybdenum and petiole nitrate nitrogen.

## **Plant Analysis vs. Soil Testing**

Soil testing and plant tissue analysis are similar in that they both measure nutrients necessary for plant growth. Soil tests are most useful before planting to predict lime and fertilizer needs; tissue tests are best used during the growing season to monitor plant nutrient uptake. When growth problems occur, both

tests are necessary to provide a complete diagnosis of a crop's nutritional status and the best corrective action.

Soil tests measure levels of specific nutrients in a soil. They cannot indicate whether plants growing in that soil are able to take up the nutrients. Soil tests are also not reliable indicators of nitrogen and sulfur (which leach readily from the soil) or iron and boron. They are, however, the best way to assess soil pH.

Plant tissue analysis indicates whether adequate concentrations of essential plant nutrients are present at the time of sampling. Alone, it does not provide enough information to explain why nutrient levels may be high or low. In combination, however, soil test and plant analysis results often reveal the reason.

## **Field Applications**

Tissue analysis can be used to (1) monitor nutrient status or (2) diagnose existing nutrient problems. Monitoring involves sampling healthy crops to fine-tune fertilization strategy or identify appropriate time of harvest. Diagnostic analysis involves taking samples from unhealthy or discolored plants to find out if any nutrient concentrations are too high or too low.

### **Monitoring Nutrient Status**

Tissue testing is a way to monitor the nutrient status of healthy crops to identify changes in nutrient needs as the growing season progresses. In the coastal plain, rainfall can leach nutrients—such as sulfur, nitrogen and, to a lesser extent, potassium—out of the root zone. With regular monitoring, growers will know when additional nutrients are needed.

Nutrient monitoring is most profitable for high-value, intensively managed crops like cotton, tobacco, fruits and vegetables. Adjustments to fertilization based on samples collected weekly or biweekly from prebloom through the early reproductive season have a major impact on final yields. Tissue tests are also useful in deciding how much nitrogen to apply to spring wheat or when to harvest tobacco.

### **Diagnosing Nutrient Problems**

To diagnose nutrient deficiencies or toxicities, follow this procedure:

- 1) take separate tissue samples from “good” plants that are growing well and “bad” plants that do not look healthy and
- 2) take matching soil samples from the root zones of each group of plants.

Soil samples supplement tissue samples by providing information on soil fertility, pH and soluble salts. Comparison of the two samples can help reveal whether nutrition or other factors—such as pests, disease or environmental stress—are involved.

## **The Sample**

Reliable tissue test results depend on collecting best indicator samples and adhering to a consistent sampling procedure. The best time to take samples is between mid-morning and mid-afternoon, avoiding rain events. It is also important to keep samples free of soil contamination.

Sampling procedures vary according to crop type and growth stage. Instructions and sample submission forms are available online at [www.ncagr.gov/agronomi/sampleinfo.htm](http://www.ncagr.gov/agronomi/sampleinfo.htm).